

two or three degree of freedom mouse device **17**, pen based or gestural input, paper scanning input, microphones **18** for audio input, or any other supported input mechanism. In addition to visual display output through monitor **15** or flat panel display **14**, various non-visual computer output is possible with output module **29**, which may include but is not limited to audio output, tactile output, force feedback output (with force feedback mice or joysticks), text and graphics printers, or any other suitable output mechanism. The computer **20** can be connected by local network **24** with associated operating or archival storage **25**, and can be further connected to any conventional internetwork **26** for retrieval or dissemination of data.

[0032] For purposes of the present invention, one can use high quality CRT monitors, passive or active matrix liquid crystal flat panel displays, various plasma, electrooptical, or microoptomechanical displays, or any other conventional visual display as a display **14** and **15**. Good results are obtained by use of CRT monitors that can support 1280 by 1024 pixels. Even better results can be obtained by use of amorphous silicon, active matrix flat panel displays, such as sold by dpiX, Inc. of Palo Alto, Calif. For example, one suitable dpiX flat panel display has a 13.5 inch diagonal size, with viewable display area of 276 mm by 200 mm, and 3072 by 2240 pixels to support a resolution of about 300 dpi with 16 gray levels. Such high resolution displays are capable of legibly presenting textual information with a font pitch as low as 3 points, although 4 or 5 point text is more typically used as a lower limit of font size to minimize eyestrain. These displays can be connected to a PCI controller card coupled to computer **20**, and currently are supported under the Windows NT computer operating system. As will be appreciated, any of the foregoing displays can be used in conjunction with various absolute or relative position sensitive touchpads or writing tablets (which may optionally overlay the display or be separately connected to computer **20**) to allow direct annotation of the screen through conventional pen-based input techniques.

[0033] As seen in **FIG. 2**, a flat panel display **14** (previously illustrated in **FIG. 1**) presents a computer-controlled graphical and textual display **40** to a user. The display **40** is created by negotiation (using negotiation module **36**, a software module executing on computer **20** of **FIG. 1**) between a primary body of data (represented by box **34**) and a supporting body of data (generally represented by box **32**, with supporting data derived from various sources of data **62**, **64**, or **66**). As can be seen with reference to **FIG. 2**, the display **40** includes text **48** and graphics **46**, tables **50**, and various annotation tags (including annotation tag **52**). The annotation tag **52** (which is associated with textual data from one of sources of data **62**, **64**, or **66**) can be selected by moving a mouse operated cursor **58** into a region of user focus **59**, initiating an animated launch sequence that results in display of a "callout" textual annotation **56**. The expansion animation typically takes anywhere from about a quarter second to about two seconds, sufficient for allowing a user to keep visual track of the expanding annotation and maintain proper contextual focus. When user focus changes by movement of the mouse cursor, the annotation tag is replaced and the primary body of data reverts to its original format by a reverse, contracting animation. As will be appreciated, the animation speed can be fully controllable, with high speed "pop-up" display annotations being pre-

sented for brief annotations, and longer animations being used for more complex annotations positioned far from the annotation tag.

[0034] As will be appreciated, data shown in the display **40** can include text, graphics, or mixtures of textual and graphical elements (such a spreadsheet table **50** of **FIG. 2**). The present invention encompasses display of a primary body of data **34** that may be text such as electronic mail-notes, novels, software code, or poetry, as well as graphical data such as maps, photographs, or geographic information systems. Applications employing substantial amounts of both text and graphics, such as illustrated textbooks, instruction manuals, or spreadsheets, are also suitable display candidates.

[0035] Supporting data **32** can include annotations consisting of a brief explanation positioned in the margin or between the lines of the displayed primary body of text. An annotation can include a description of a hypertext linked destination, an actual excerpt from the linked destination, the relationship of the linked destination to the source material, an annotation on the source material, meta-information such as author and creation date, hyperlink popularity or recommendation data, and combinations of these as well as other information. Authored annotations may include footnotes, cross-references, parenthetical statements, bibliographic references, current section, page numbers, figures, tables, sidebars, tables, copyright, or definitions. Personal annotations can include corrections, additions, deletions, notes, reviewer's comments, or bookmarks within a page. Hierarchical information such as mathematical proofs, outline subheadings, tables of contents, diagram callouts, or step-by-step instructions may also be suitable for some embodiments of the invention. In certain embodiments, logical or relational structures such as may be provided by character or paragraph formatting, or spreadsheet constraint graph information, can be used to enhance understanding of the primary body of data **34**.

[0036] Similarly, the annotation tag can be primarily textual, primarily graphical, or some mixture of textual and graphical elements. Contemplated annotation tags include numeric tags (e.g. footnote numerals), greeked or unreadably small interlinear or marginal text, symbols (e.g. an asterisk or star shaped symbol) or thumbnail graphics or drawings in the margin. In certain preferred applications, the annotation tags can be a very small, yet still readable, version of the supporting body of data. For example, the annotation can be a clipped version of the supporting body of data, showing just the first line or first few words as 3, 4, or 5 point type, when the primary body of data is presented as 12 point type. During scaling animation, as the supporting body of data becomes more salient, the font scales up gradually over the course of a second or two, showing more and more lines in an increasing font point size. Alternatively, the information can be summarized in the annotation tag; for example, showing a summary phrase or title taken from the supporting body of data. Again, as the supporting material scales up in response to user focus, the summary is replaced with the full text.

[0037] In certain applications the annotation tag can be visually imperceptible to the user until a pointer or other indicator of user focus is directed at a region about the annotation tag. For example, annotation tags can be based on